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RF exposure analysis for the equipment WT41-E (FCC ID: QOQWT41E)

The device WT41-E (FCC ID: QOQWT41E) is designed as module to be installed in mobile exposure host platform. The analysis provided in this document covers mobile exposure conditions and for that the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter except in the conditions described in this document.

MPE exposure limits

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1,0	30

As all the operating frequencies of this device are higher than 1500 MHz, the applicable maximum permissive exposure is: 1 mW/cm².

Using the equation $S = \frac{PG}{4\pi R^2}$ to calculate the exposure to electromagnetic fields

where: S = power density (in appropriate units, e.g. mW/cm²)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Compliance with FCC and IC maximum permissive exposure limits is demonstrated based on the following calculations.

1. Standalone operations analysis

Frequency band (MHz)	Mode	BW (MHz)	Channel / Freq.	Data Rate	Antenna output power (dBm)	Antenna output power (mW)	Antenna gain (dBi)	Antenna gain (numerical)	Duty cycle (%)	Evaluation distance (cm)	Power density (mW/cm ²)	FCC/IC MPE limit (mW/cm ²)	MPE RATIO
2400-2483,5	Bluetooth BR (Modulation: GFSK)	1	0 / 2402	1 Mbps	15,34	34,198	12	15,85	100%	20	0,108	1,000	0,108
			40 / 2441		15,64	36,644	12	15,85	100%	20	0,108	1,000	0,108
			79 / 2480		15,94	39,264	12	15,85	100%	20	0,108	1,000	0,108

Conclusion: The equipment complies with the FCC MPE limits and the maximum MPE ratio obtained is **0,108**.

2. Co-location analysis in mobile exposure conditions

2.1. Co-location with other transmitter in mobile exposure conditions

According to KDB 447498 D01 General RF Exposure Guidance v05r2, 7.2:

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

Conclusion: As the maximum calculated MPE ratio for the device is **0,108**, the product can be co-located with other antennas providing that the sum of the MPE ratios for all the other simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density is ≤ 1.0 – **0,108 = 0,892**.

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